UNITED STATES PATENT AND TRADEMARK OFFICE

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10/814,782	04/01/2004	Yoshiaki Sakagami	62533.00008	4968

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 January 2008*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

   4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☒ Claim(s) *1* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _____ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   a)☒ All   b)☐ Some *   c)☐ None of:

   1.☒ Certified copies of the priority documents have been received.

   2.☐ Certified copies of the priority documents have been received in Application No. _____.

   3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

   * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
   Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The amendment submitted January 9, 2008 has been entered.

The objections to the drawings, specification and claim 11 have been withdrawn.

Response to Arguments

Applicant's arguments with respect to claim1, 10 and 11 have been considered

but are moot in view of the new ground(s) of rejection.

Claim Objections

Claim 1 is objected to because of the following informalities: In the 3rd line of the

paragraph starting, "Means for controlling movement", the examiner believes the phrase

"recognized by said means for recognizing a distance to the subject, at a predetermined

distance" should read "recognized by said means for recognizing a subject *to be*

followed up, at a predetermined distance". Appropriate correction is required.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can

be found in a prior Office action.

Claims **1-2 and 5-8** rejected under 35 U.S.C. 103(a) as being unpatentable over

U.S. Patent No. 6,556,892 to Kuroki et al. (Kuroki) in view of "Vision Based Tracking

with a Mobile Robot, Christian Schlegel, Jorg Illmann, Heiko Jaberg, Matthias Schuster,

Robert Worz, 1998, (Schlegel).

Regarding amended independent **claim 1**, "An apparatus for controlling a movable robot comprising a camera, moving means, and a device for outputting a sound, which comprises: "– reads on Kuroki Fig 4, where a movable robot, having a picture input device (251), left and right legs, (331R and 331L) and a speech output device (253) is shown – Fig. 4 is described at col. 6, line 3 to col. 7 line 36.

"means for recognizing a subject to be followed up, which recognizes the subject on the basis of an image taken by the camera;" - reads on the authentication processor (114) of Kuroki Fig. 5, described at Col. 8 lines 44-56 which uses previously stored face images, and images of other body parts to authenticate (recognize) a valid user of the system. Even if Kuroki's authentication processor was insufficient for recognizing a subject to be followed up, Schlegel on page 420, paragraph 3.1.1 states that at startup, the person to be followed introduces itself to the robot. It would have been obvious to one of ordinary skill in the art at the time of the invention to augment the prior art method of Kuroki with the Schlegel's introduction to yield a positive identification of the subject to be followed.

"means for recognizing a distance to from the subject having been recognized by the means for recognizing a subject to be followed up;" – Kuroki does not measure the distance to the subject to be followed up, but Schlegel, which uses dual cameras instead of the single camera of Kuroki, determines the distance between the robot and the person using the disparity between the two simultaneous images as detailed on page 425, 1st full paragraph. It would have been obvious to one of ordinary skill in the

art at the time of the invention to use the known technique of using dual cameras to improve Kuroki's robot by allowing it to measure distance to viewed objects.

"means for controlling movement, which controls said moving means so as to keep the distance from said movable robot to the subject, having been recognized by said means for recognizing a distance to the subject, at a predetermined distance; and " - Kuroki does not follow the identified subject, but Schlegel follows the identified subject since it is a follower robot. Further, Schlegel maintains a distance between the robot and the person as mentioned on page 425, line 5-8. It would have been obvious to one of ordinary skill in the art at the time of the invention to apply Schlegel's known technique of following to the subject previously identified by Kuroki at a distance in order to have Kuroki's robot be more human-like.

"means for controlling the outputting of a sound, which outputs a sound or a voice related to the distance to the subject" – Reads on Kuroki's speech synthesis unit Fig. 5 120 as described at col. 9, lines 16-22. While Kuroki does not detail the robot discussing the distance to the person, in col. 9, lines 9-12 it describes a dialog management unit 124 that generates a reply to a user input via a speech synthesis unit 120 and subsequently outputs the reply via a loudspeaker. There is no reason to assume that the robot using the Kuroki/Schlegel combination could not be programmed to output a sound when the distance between the robot and the person became too large.

wherein the sound or the voice from the means for controlling the outputting of a sound informs the subject about a situation regarding the distance to the subject, so as

to prompt the subject to keep the distance from said movable robot to the subject at the

predetermined distance. Schlegel reports that its robot was able to track and follow

persons robustly in real time; hence there was little reason for the tracking robot to

speak. However, the capabilities in the Kuroki robot would have been able cause a

Kuroki/Schlegel robot to utter words to inform the subject about the situation if needed.

Regarding **claim 2**, which is dependent on Claim 1, "wherein said moving

means of the movable robot moves by two legs' walking." – Reads on Kuroki's Legs

(101R and 101L) of Fig. 1 as described in col. 43-53.

Regarding **claim 5**, which is dependent on Claim 1, "wherein the subject to be

followed up is a person, and which further comprises means for judging instruction from

a person." - – reads on Kuroki col. 7, lines 47-52 for person recognition and col. 8, lines

24-34 for interpreting spoken commands such as "run", and "hurry".

Regarding **claim 6**, which is dependent on Claim 5, "wherein said means for

judging instruction from a person judges whether or not the robot follows up the person

based on the results of recognition in which the person is recognized from the face

image." – Reads on Kuroki col. 7, lines 47-52 for person authentication. Further reads

on Schlegel where in paragraph 3.1.1 the person introduces itself and is recognized

from the face and clothes being worn. This is helpful as when the person is being

followed, they are no longer facing the robot. It would have been obvious to one of

ordinary skill in the art at the time of the invention to combine the authentication type of

recognition of Kuroki and the situational identification of Schlegel to yield a more robust

recognition.

Regarding **claim 7**, which is dependent on Claim 6, "wherein said means for

judging instruction from a person judges the instruction from the person based on at

least one of posture, and gesture of said person." - – Reads on Kuroki col. 8, lines 52-

54 for interpreting hand gestures.

Regarding **claim 8**, which is dependent on Claim 5, "wherein said means for

judging instruction from a person judges the instruction from the person based on a

voice vocalized from said person." – reads on Kuroki col. 8, lines 24-34.

Claims **3-4** are rejected under 35 U.S.C. 103(a) as being obvious over Kuroki in

view of Schlegel and further in view of U.S. Patent Publication No. 2004/0230340 to

Fukuchi et al. (Fukuchi).

Regarding **claim 3**, which is dependent on Claim 1, "which further comprises

means for holding map information, which holds map information of an area within

which said movable robot moves, and" - While the robots of both Kuroki and Schlegel

incorporate memory which could hold maps, maps are not mentioned. However,

Fukuchi uses part of the memory to hold map information map of the local environment

of the area – Fig. 5 and ¶19. It would have been obvious to one of ordinary skill in the

art at the time of the invention to incorporate the map holding mechanism of Fukuchi
into the robot described by the combination of Kuroki and Schlegel to enhance the
abstract input data on which Kuroki models a behavior.

"wherein said means for controlling movement determines the actuation of said
moving means based on the map information held in said means for holding map
information." - – While Kuroki and Schlegel are silent on maps, Fukuchi enhances its
maps, determining landmarks, obstacles and safety zones. Fukuchi then uses these
map features to guide movement - ¶19. Once the map was incorporated in the robot of
Kuroki and Schlegel, it would have been obvious to one of ordinary skill in the art at the
time of the invention to use the data so contained.

Regarding **claim 4**, which is dependent on Claim 3, "wherein a restricted area
which prohibits approach is set in said map information held in said means for holding
map information." Fukuchi describes recognizing mobility regions in its map -¶67 – and
conversely does not enter regions that are not mobile areas – such as obstacles,
landmarks and safety areas - ¶81. It would have been obvious to one of ordinary skill in
the art at the time of the invention to use these features of Fukuchi with the combined
robot to better interact with the human environment.

Claim **9** is rejected under 35 U.S.C. 103(a) as being obvious over Kuroki in view
of Schlegel and further in view of UK Patent Application No. GB 2 258 098 to Na (Na).

Regarding **claim 9**, which is dependent on Claim 1, "wherein said means for controlling the outputting of a sound changes a volume of voice outputted to said device for outputting a sound, based on a circumferential noise level." – Neither Kuroki nor Schlegel mentions changing the sound based on the ambient noise. However, Na teaches automatically controlling the volume of sound based on background noise. (Page 1, lines 6-9). It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the volume control feature of Na in the moving robot described by the combination of Kuroki and Schlegel to assure that the robot can be heard.

Claims **10-11** are rejected under 35 U.S.C. 103(a) as being obvious over Kuroki in view of Schlegel and further in view of Japanese Patent No. JP-2005202078 A to Shimomura (Shimomura). Claims 10 and 11 are to a process for using the apparatus of claim 1 and to a computer readable medium containing a program to execute the process of claim 10. They will be treated together.

Regarding amended independent **claims 10 and 11,** "A process for controlling a movable robot comprising a camera, moving means, and a device for outputting a sound, which comprises:" – – reads on Kuroki Fig 4, where a movable robot, having a picture input device (251), left and right legs, (331R and 331L) and a speech output device (253) is controlled – Fig. 4 is described at col. 6, line 3 to col. 7 line 36.

"a step for recognizing a subject to be followed up, which recognizes the subject on the basis of an image taken by the camera;" - reads on the authentication processor

(114) of Kuroki Fig. 5, described at Col. 8 lines 44-56 which uses previously stored face images, and images of other body parts to authenticate (recognize) a valid user of the system. Even if Kuroki's authentication processor was insufficient for recognizing a subject to be followed up, Schlegel on page 420, paragraph 3.1.1 states that at startup, the person to be followed introduces itself to the robot. It would have been obvious to one of ordinary skill in the art at the time of the invention to augment the prior art method of Kuroki with the Schlegel's introduction to yield a positive identification of the subject to be followed.

"a step for recognizing a distance to the subject having been recognized by the step for recognizing a subject to be followed up;" -- Kuroki does not measure the distance to the subject to be followed up, but Schlegel, which uses dual cameras instead of the single camera of Kuroki, determines the distance between the robot and the person using the disparity between the two simultaneous images as detailed on page 425, 1st full paragraph. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the known technique of using dual cameras to improve Kuroki's robot by allowing it to measure distance to viewed objects.

"a step for controlling movement, which controls said moving means so as to keep the distance to the subject having been recognized by said step for recognizing a distance to the subject at a predetermined distance; and"- Kuroki does not follow the identified subject, but Schlegel follows the identified subject since it is a follower robot. Further, Schlegel maintains a distance between the robot and the person as mentioned on page 425, line 5-8. It would have been obvious to one of ordinary skill in the art at

the time of the invention to apply Schlegel's known technique of following to the subject previously identified by Kuroki at a distance in order to have Kuroki's robot be more human-like.

"a step for controlling the outputting of a sound, which outputs a sound or a voice related to the distance to the subject, " - – Reads on Kuroki's speech synthesis unit Fig. 5 120 as described at col. 9, lines 16-22. While Kuroki does not detail the robot discussing the distance to the person, in col. 9, lines 9-12 it describes a dialog management unit 124 that generates a reply to a user input via a speech synthesis unit 120 and subsequently outputs the reply via a loudspeaker. There is no reason to assume that the robot using the Kuroki/Schlegel combination could not be programmed to output a sound when the distance between the robot and the person became too large. Further while neither Kuroki nor Yoshinori mention changing the sound based on distance to the subject, Shimomura teaches changing the speech form, such as sound volume, speed and intonation based on the distance detected between the robot and the user – see Derwent 2005-53276 Basic Abstract. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the volume control feature of Shimomura in the moving robot described by the combination of Kuroki and Schlegel to further increase the human-like aspect of the robot.

"wherein the sound or the voice from the step for controlling the outputting of a sound informs the subject about a situation regarding the distance to the subject, so as to prompt the subject to keep the distance from said movable robot to the subject at the predetermined distance." - Schlegel reports that its robot was able to track and follow

persons robustly in real time; hence there was little reason for the tracking robot to

speak. However, the capabilities in the Kuroki robot would have been able cause a

Kuroki/Schlegel robot to utter words to inform the subject about the situation if needed.

Conclusion

The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure: Harai, N. and Mizoguchi, H. *Visual Tracking of Human Back and*

Shoulder for Person-following Robot, Proceedings 2003 IEEE/ASME Int. Conf. on

Advanced intelligent Mechatronics (AIM 2003) pp. 527-532 for person following robot;

Kaplan, F., *Talking AIBO: First Experimentation of Verbal Interactions with an*

Autonomous Four-legged Robot, Proceedings of the CELE-Twente workshop in

interacting agents 2000 – for talking Robot interactions; Xu, L., Zein-Sabatto, S. and

Sekman, A., *Development of Intelligent Behaviors for a Mobil Robot.* 0-7803-6661-1/01/

©2001 IEEE pp. 383-386 – for speaking robot; and BIRON – the Bielefeld Robot

Companion, http://www.techfak.net/ags/ai/projects/BIRON/welcome.html - for a robot

that meets and follows a person.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to LIN B. OLSEN whose telephone number is (571)272-

9754. The examiner can normally be reached on Mon - Fri, 8:30 -5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Thomas G. Black can be reached on 571-272-6956. The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300.

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/L. B. O./
Examiner, Art Unit 3661

/Thomas G. Black/
Supervisory Patent Examiner, Art Unit 3661